downstream neighbor. If all bits of the bit mask are zero, the label is fully determined by the upstream neighbor, otherwise any bit mask is set-able by the downstream neighbor.

Armitage states, at col. 3, lines 31-33 "... On receiving a label bind from a downstream neighbor 20, an LSR may immediately splice this label to labels it has provided, or will provide, to its upstream neighbor..." (See also, Figure 4, step 21).

Claim 7 of Armitage recites the steps of: "... removing said routing label attached to a stream of data packets at said first label routing router, at an adjacent one of said label routing router which assigned said last mentioned router label to said first label routing router, before the stream of data packets travels on to another label routing router that is not adjacent to said first label routing router...adding a different routing label onto said last mentioned stream of data packets received at said adjacent one of said label routing routers to replace the routing label removed thereat, said different label routing router adjacent to said last mentioned adjacent label routing router, but not adjacent to said first label routing router, and associated with routing labels assigned by said adjacent one of said label routing routers to said first label routing router and subsequently received..." In essence, the claim states that a router B, disposed between two routers A and C, uses a different label to communicate with a router A than it uses to communicate with a router C.

U.S. Patent 6,330,614, Aggarwal:

Aggarwal describes a technique for re-using the checksum field space in the header in the current Internet or private IP networks for increasing the processing speed of Internet datagrams. Aggarwal describes combining a group of Routers into Autonomous Systems (AS), and assigning the same unique number to all routers in the system (col. 11, lines 41-43). The AS field is stored in the checksum field, and core routers forward datagrams by using the AS number stored in the checksum field, *in addition to the regular IP address* of the network device. (Since the AS field is used to designate a group of routers, some sort of address is still required to identify the destination device of an AS).

Aggarwal states, at col. 11, lines 55-68:

> "... When EGP Cloud 1 learns network addresses from Network B, it will advertise these addresses to EGP Cloud 2. EGP Cloud 2 would now associate AS number X in its forwarding table entry for network addresses learned from EGP Cloud 2. *If all Routers*

used this invention, then Edge Routers would insert AS numbers in the Checksum field and every router in the network would associate an egress port per AS number. If some host on network Y wants to communicate with another host on Network B, Fig. 10, then the first Router in EGP Cloud 2 would examine the AS number in the Checksum Field within one memory lookup would know to forward it to EGP Cloud 1. When the datagram reaches EGP Cloud 1, the first router would know that the destination is connected to its own network, and then it would start to forward, based on the destination network in the IP header..."

Applicants note that no mention, suggestion or description is made in Aggarwal of replacing labels as AS boundaries are crossed.

Combination neither describes nor suggests the claimed invention

Claim 1 recites "... A method for establishing a label switched path across multiple autonomous systems, the method comprising ... *mapping a first label from a first autonomous system to a second, label in a second autonomous system*; receiving from said first autonomous system a protocol message including said first label; *replacing* said first label with said second label in said protocol message; and forwarding said protocol message to a downstream neighboring (next hop) device in said second autonomous system..."

The Examiner states "... Armitage teaches... mapping... receiving ... swapping ... and forwarding... however, the prior art of record does not explicitly teach wherein said upstream and downstream neighboring devices are in respective first and second autonomous systems..." "Aggarwal teaches a system ... related to using a Label distribution Protocol to establish label switched paths ... *wherein a first label from an upstream neighboring device is mapped to a second label from an downstream neighboring device in a second autonomous system* (Fig. 10) (col. 11 lines 51 – col 12 line 12, lookup mapping, col 4 lines 54 – col. 5 line 16).

Applicants respectfully disagree with the Examiners position that Aggarwal teaches "wherein a first label from an upstream neighboring device is mapped to a second label from a downstream neighboring device...". The portion of text cited by the Examiner at col. 11, lines 51-col. 12 line 12 recites merely that "If some host on network Y wants to communicate with another host on network B, Fig. 10, then the first Router in EGP Cloud 2 would examine the AS number in the checksum Field and within one memory lookup would know to forward it towards EGP Cloud 1. When the datagram reaches EGP cloud 1, the first router would know that the

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destination is connected to its own network and then it would forward, based on the destination network in the IP header..." In Aggarwal, there is no 'second label', rather the 'first label' is used at the destination node as an identifier, and the IP address adds further delineation.. In effect, what Aggarwal teaches is the use of a stacked address, which leads to the correct autonomous system, with IP addresses being used once the correct autonomous system is identified. (Further support for this inference is found at column 12, where Aggarwal mentions the use of IP stacking).

As stated at page 4, lines 8-11 of the instant specification "One disadvantage is that the two-tier mechanism requires that BGP be modified or extended to distribute labels. Another disadvantage is that the label stack adds a substantial amount of overhead per packet..."

The present invention overcomes the problems of the prior art, such as Aggarwal, which uses two tiers of addressing (an AS as well as an internal IP address) to locate a node. [Aggarwal states explicitly at column 11, lines 40-44 "In the Core of the Internet, Routing Control Protocols , e.g., BGP, combine a group of Autonomous Systems (AS) and *assigns the same unique number to all routers in the system...*" At column 12, lines 1-5 Aggarwal states "When the datagram reaches the EGP Cloud 1, the first router would know that the destination is connected to its own network and then it would start to forward, *based on the destination network in the IP header...*"]

It would appear to the Applicant that the Examiner is not giving patentable weight to the term 'Autonomous Systems', as recited in the claimed invention. At issue is whether internetworking (between individual routers) is the same as intra-networking (between different domains of routers). Given that different protocols are provided for handling each of the different types of communications, it is evident to the Applicant that the two types of communications are not the same, and thus patentable weight must be given to the Applicants use of the term 'autonomous systems'.

Because patentable weight must be given to this term, Applicant's submit that the combination of the two neither describes nor suggests the claimed invention. The only disclosed method of propagating intra-domain 'labels' is in Aggarwal. Thus, the only proper combination of references incorporates the teachings of Armitage with regard to labels into the system of Aggarwal, and would still result in a label stacked result. Any other combination does not

properly take into effect the patentable weight of the term 'autonomous systems', and thus cannot be supported.

In the previous response, the Applicant provided a similar argument as put forth above. In response to this argument, the Examiner stated, at page 5 of the office action:

> "... In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (... where an AS and IP address are used to cross AS boundaries...)... are not recited in the rejected claims..."

In response to this statement, Applicants submit that the Examiner mis-read the previous response; for the record, Applicant's *never* stated that any such element was part of the instant invention, but were reciting what Applicant viewed as the only permissible combination of Aggarwal and Armitage. Closer reading of the response clearly shows, also, that Applicant dealt with the combination of references, rather than the references individually, as asserted by the Examiner.

Accordingly, because the combination of Armitage and Aggarwal fail to teach the limitations of Claim 1, claim 1 is patentably distinct over the references and the rejection should be withdrawn.

Independent claims 6, 11, 16 and 17 recite subject matter similar to that put forth with regard to claim 1 and are therefore allowable with claim 1. Dependent claims 2-5, 7-10 and 12-15 depend upon parent claims 1, 6, and 11, respectively, add further patentable weight to their parent claims and are patentable for at least the reasons put forth with regard to the parent claims.

No motivation for the modification suggested by the Examiner

The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990)

Applicants submit that there is no motivation for the modification suggested by the Examiner, because there the prior art explicitly states the undesirability of the use of MPLS labels. Although the Examiner relies on the Abstract of Aggarwal to support the fact that

Aggarwal does not teach away from MPLS, the Examiner is ignoring the explicit teachings of Aggarwal. In the Abstract, Applicants note, Aggarwal does not say that it supports MPLS, but that it supports "MPLS-type" protocols. The system of Aggarwal explicitly states "... using the invention, the creating of a new protocol as defined by MPLS is avoided, and instead the current IP header may be used to accomplish the same function..." Thus, Applicant maintains their posture that Aggarwal teaches away from the use of labels as used in Armitage, and there would be no motivation for the combination of the two references.

It is well established that the test for obviousness is what the combined teachings of the references would have suggested to one of ordinary skill in the art, and all teachings in the prior art must be considered to the extent that they are in analogous arts. Where the teachings of two or more prior art references conflict, the examiner must weigh the power of each reference to suggest solutions to one of ordinary skill in the art, considering the degree ***to which one reference might accurately discredit another.*** *In re Young*, 927 F.2d 588, 18 USPQ2d 1089 (Fed. Cir. 1991)

Applicants submit that the Examiner is not giving weight to the goal of Aggarwal, which is explicitly stated at column 12 as "use of the invention for eliminating MPLS headers..." Accordingly, because there is no motivation for the combination of references, Applicant submits that the rejection is improper and should be withdrawn.

Conclusion

Applicants have made a diligent effort to place the claims in condition for allowance. However, should there remain unresolved issues that require adverse action, it is respectfully requested that the Examiner telephone Lindsay McGuinness, Applicants' Attorney at (978) 264-6664 so that such issues may be resolved as expeditiously as possible.

For these reasons, and in view of the above amendments, this application is now considered to be in condition for allowance and such action is earnestly solicited.

Respectfully Submitted,

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CLAIMS

1. (Currently amended) A method for establishing a label switched path across multiple autonomous systems, the method comprising:

mapping a first label from a first autonomous system to a second label in a second autonomous system;

receiving from said first autonomous system a protocol message including said first label;

replacing said first label with said second label in said protocol message; and

forwarding said protocol message to a downstream neighboring (next hop) device in said second autonomous system.

2. The method of claim 1, comprising:

establishing an incoming label switched path over said first autonomous system;

associating said first label with said incoming label switched path;

establishing an outgoing label switched path over said second autonomous system;

learning said second label associated with said downstream neighboring (next hop) device in said second autonomous system;

mapping said first label from said autonomous system to said second label in said second autonomous system;

receiving from said first autonomous system said protocol message including said first label;

replacing said first label with said second label in said protocol message; and

forwarding said protocol message to said downstream neighboring (next hop) device in said second autonomous system.

3. The method of claim 2, wherein establishing said outgoing label switched path over said second autonomous system comprises:

using a Label Distribution Protocol to set up said outgoing label switched path to a downstream neighboring border device.

4. The method of claim 2, wherein learning said second label associated with said downstream neighboring (next hop) device in said second autonomous system comprises:

establishing a Label Distribution Protocol session with said downstream neighboring (next hop) device; and

receiving said second label associated with said downstream neighboring (next hop) device in said second autonomous system via said Label Distribution Protocol session.

5. The method of claim 2, wherein mapping said first label from said first autonomous system to said second label in said second autonomous system comprises:

maintaining a label information base; and

creating in said label information base a label information base entry mapping said first label from said first autonomous system to said second label in said second autonomous system.

6. A device for establishing a label switched path across multiple autonomous systems, the device comprising:

mapping logic operably coupled to map a first label from a first autonomous system to a second label in a second autonomous system;

receiving logic operably coupled to receive from said first autonomous system a protocol message including said first label;

replacing logic responsive to the receiving logic and operably coupled to replace said first label with said second label in said protocol message; and

forwarding logic responsive to the replacing logic and operably coupled to forward said protocol message to a downstream neighboring (next hop) device in said second autonomous system.

7. The device of claim 6, comprising:

first label switched path establishing logic operably coupled to establish an incoming label switched path over said first autonomous system and associate said first label with said incoming label switched path;

second label switched path establishing logic responsive to said first label switched path establishing logic and operably coupled to establish an outgoing label switched path over said second autonomous system;

label distribution logic operably coupled to obtain said second label from said downstream neighboring (next hop) device in said second autonomous system;

mapping logic operably coupled to map said first label from said first autonomous system to said second label in said second autonomous system;

receiving logic operably coupled to receive from said first autonomous system said protocol message including said first label;

replacing logic responsive to said receiving logic and operably coupled to forward said protocol message to said downstream neighboring (next hop) device in said second autonomous system.

8. The device of claim 7, wherein said second label switched path establishing logic comprises Label Distribution Protocol logic.

9. The device of claim 7, wherein said label distribution logic comprises Label Distribution Protocol logic operably coupled to establish a Label Distribution Protocol session with said downstream neighboring (next hop) device and receive said second label associated with said downstream neighboring (next hop) device in said second autonomous system via said Label Distribution Protocol session.

10. The device of claim 7, further comprising a label information base, wherein said mapping logic is operably coupled to create in said label information base a label information base entry mapping said first label from said first autonomous system to said second label in said second autonomous system.

11. A program product comprising a computer readable medium having embodied therein a computer program for establishing a label switched path across multiple autonomous systems, the computer program comprising:

mapping logic programmed to map a first label from a first autonomous system to a second label in a second autonomous system;

receiving logic programmed to receive from said first autonomous system a protocol message including said first label;

replacing logic responsive to the receiving logic and programmed to replace said first label with said second label in said protocol message; and

forwarding logic responsive to the replacing logic and programmed to forward said protocol message to a downstream neighboring (next hop) device in said second autonomous system.

12. The program product of claim 11 comprising:

first label switched path establishing logic programmed to establish an incoming label switched path over said first autonomous system and associate said first label with said incoming label switched path;

second label switched path establishing logic responsive to said first label switched path establishing logic and programmed to establish an outgoing label switched path over said second autonomous system;

label distribution logic programmed to obtain said second label from said downstream neighboring (next hop) device in said second autonomous system;

mapping logic programmed to map said first label from said first autonomous system to said second label in said second autonomous system;

receiving logic programmed to receive from said first autonomous system said protocol message including said first label;

replacing logic response to said receiving logic and programmed to replace said first label with said second label in said protocol message; and

forwarding logic responsive to said replacing logic and programmed to forward said protocol message to said downstream neighboring (next hop) device in said second autonomous system.

13. The program product of claim 12, wherein said second label switched path establishing logic comprises Label Distribution Protocol logic.

14. The program product of claim 12, wherein said label distribution logic comprises Label Distribution Protocol logic programmed to establish a Label Distribution Protocol session with said downstream neighboring (next hop) device and receive said second label associated with said downstream neighboring (next hop) device in said second autonomous system via said Label Distribution Protocol session.

15. The program product of claim 12, wherein said mapping logic is programmed to maintain a label information base and to create in said label information base a label information base entry mapping said first label from said first autonomous system to said second label in said second autonomous system.

16. A communication system comprising a plurality of autonomous systems, each autonomous system having at least a border device that is shared with another autonomous system, wherein the shared border device links an incoming label switched path from an incoming autonomous system to an outgoing label switched path in an outgoing autonomous system.

17. An information base comprising at least one entry mapping a first label from a first autonomous system to a second label in a second autonomous system.